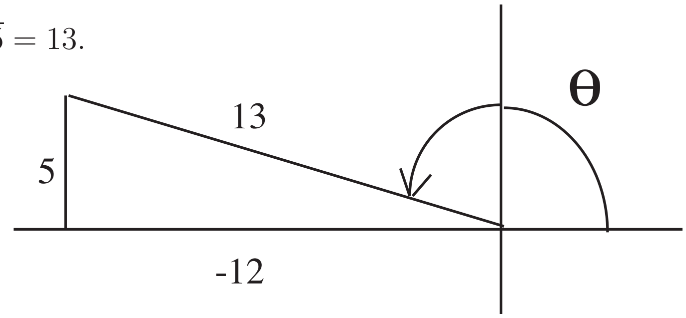
# Math 002 – Term 052
# Recitation hour (5.3 & 5.4)

**Q1)** If the terminal side of an angle $\theta$ passes through the point $(-12, 5)$, then find $\cot\theta + \csc\theta$.

<u>**Solution**</u>: $x = -12, y = 5 \implies r = \sqrt{x^2 + y^2} = \sqrt{144 + 25} = 13.$
So $\cot\theta = \frac{x}{y} = -\frac{12}{5}$, $\csc\theta = \frac{r}{y} = \frac{13}{5} \implies \cot\theta + \csc\theta = -\frac{12}{5} + \frac{13}{5} = \frac{1}{5}.$

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**Q2)** a) Find the reference angle $\theta'$ for the angles: (i) $-120^\circ$ (ii) 8 radians

b) Find the exact value of $\tan 54^\circ + \tan 126^\circ + \tan 300^\circ$

<u>**Solution**</u>: a) (i) The smallest positive angle coterminal with $-120^\circ$ is $-120^\circ + 360^\circ = 240^\circ \in$ Q III

$\implies \theta' = 240^\circ - 180^\circ = 60^\circ$

(ii) $\theta = 8$ radians $> 2\pi$, so the smallest positive angle coterminal with 8 radians is $8 - 2\pi \approx 8 - 6.28 = 1.72$

$\in$ Q II $\implies \theta' = \pi - (8 - 2\pi) = 3\pi - 8 \approx 9.42 - 8 = 1.42$

b) Notice that $\theta = 126^\circ \in$ Q II, so $\theta' = 180^\circ - 126^\circ = 54^\circ$. For $\alpha = 300^\circ \in$ Q IV, $\alpha' = 360^\circ - 300^\circ = 60^\circ$.

Therefore $\tan 54^\circ + \tan 126^\circ + \tan 300^\circ = \tan 54^\circ + (-\tan 54^\circ) + (-\tan 60^\circ) = -\tan 60^\circ = -\sqrt{3}$

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**Q3)** If W is the wrapping function, then find $W(-\frac{13\pi}{3})$.

<u>**Solution**</u>: $W(-\frac{13\pi}{3}) = (x, y) = \left(\cos(-\frac{13\pi}{3}), \sin(-\frac{13\pi}{3})\right) = (\cos\frac{13\pi}{3}, -\sin\frac{13\pi}{3})$

$= \left(\cos(4\pi + \frac{\pi}{3}), -\sin(4\pi + \frac{\pi}{3})\right) = (\cos\frac{\pi}{3}, -\sin\frac{\pi}{3}) = (\frac{1}{2}, -\frac{\sqrt{3}}{2})$

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**Q4)** (a) Write $\cos t$ in terms of $\tan t$, $\pi < t < \frac{3\pi}{2}$.

(b) Determine whether the function $f(x) = x^3 \tan x$ is even, odd, or neither.

<u>**Solution**</u>: a) $\cos t = \frac{1}{\sec t} = \frac{1}{\pm\sqrt{1 + \tan t^2}}$, but $t \in$ Q III. So $\cos t = -\frac{1}{\sqrt{1 + \tan t^2}}$

(b) $f(-x) = (-x)^3 \tan(-x) = (-x^3)(-\tan x) = x^3 \tan x = f(x) \implies f(x)$ is even.

Solved by: A. Al-Shallali